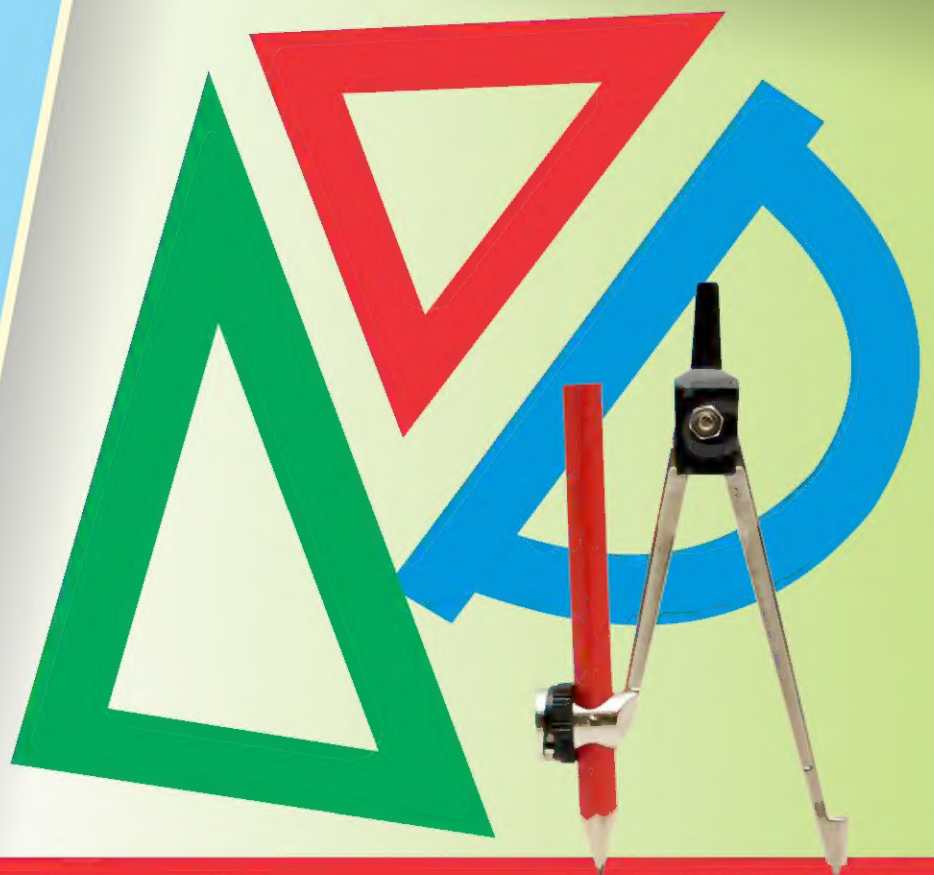


Mathematics

7



Balochistan Textbook Board, Quetta.

UNIT OUTLINES

13.1 *Frequency Distribution*

13.2 *Pie Graph*

STUDENT'S LEARNING OUTCOMES

After studying this unit, students will be able to

- ❖ Demonstrate data presentation.
- ❖ Define frequency distribution (i.e. frequency, lower class limit, upper class limit, class interval)
- ❖ Interpret and draw pie graph.

Introduction

Different questions arise in our mind and we want to understand, describe, explore and access. For example,

- How many hospitals will be required for next 10 years?
- How many teachers we need for next 5 years?
- How many doctors we will be required for next 10 years?

To know about such things, we collect information and present it in a meaningful way to draw conclusion. This process is called information handling.

13.1 Frequency Distribution**13.1.1 Presentation of Data**

The number of observations is usually very large in the collected data. It is difficult to work on the observations which are the raw data. Before we apply any statistical work on the data the observations are put into some condensed form so that the statistical work becomes simple. This is called a presentation of data.

We know that a data is collected in raw form, it provides information about individuals. Data in such form is called ungrouped data. After arranging the data into classes, it becomes group data.

For example, weights of 30 students in kilograms are given.

56, 55, 59, 58, 59, 63, 63, 61, 62, 61, 62, 62, 65, 64, 64
65, 66, 67, 69, 64, 63, 61, 69, 61, 58, 59, 65, 64, 55, 62

This is an ungroup data. If these information are arranged into groups, it becomes group data.

Group	No. of students
55 – 57	3
58 – 60	5
61 – 63	11
64 – 66	8
67 – 69	3
Total	30

Number of students whose weight from 55 to 57 = 3

Number of students whose weight from 58 to 60 = 5

Number of students whose weight from 61 to 63 = 11

Number of students whose weight from 64 to 66 = 8

Number of students whose weight from 67 to 69 = 3

13.1.1 Frequency Distribution

The conversion of ungroup data into suitable number of classes, each class containing the observations which lie within the class, is called a frequency distribution.

The table in which frequency of class intervals is shown, called the frequency table.

Frequency

Frequency of a class is the number of observations following in that class. Frequency is denoted by f .

In the previous example

The frequency of (55 – 57) is 3

The frequency of (58 – 60) is 5

and so on.

Class Limits

Lower Class Limit

The smaller value of a class interval is called the lower class limit, e.g. In the class interval (55 – 57), 55 is the lower class limit.

Upper Class Limit

The larger value of a class interval is called the upper class limit, e.g. In class interval (55 – 57), 58 is the upper class limit.

Class Interval

In group data every group or class is called class interval. For example (55 – 57), (61–63) are class intervals.

Example Observe the following table and answers the question given below:

Class Interval	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40
Frequency	2	5	9	6	3

- (i) Tell the frequency of class interval (21 – 25).
- (ii) Which class interval has maximum frequency?
- (iii) What is the lower class limit of class interval (36 – 40)?
- (iv) What is the upper class limit of class interval (26 – 30)?
- (v) Which class interval has lowest frequency?

Solution

- (i) 5 (ii) 26 – 30 (iii) 36 (iv) 30 (v) 15 – 20

EXERCISE 13.1

1.

Groups / Classes	Frequency (<i>f</i>)
10 – 19	3
20 – 29	9
30 – 39	15
40 – 49	17
50 – 59	8
60 – 69	5

- (i) What will be the lower class limit whose frequency is 15?
- (ii) What is frequency of group (50 – 59)?
- (iii) What is the class limit of last group?
- (iv) In above given data how many class intervals are?
- (v) Tell the group of having maximum frequency.

2.

Groups / Classes	Frequency (f)
31 – 40	5
41 – 50	9
51 – 60	20
61 – 70	15
71 – 80	6

In above data give the answers of the following questions.

- (i) In which group strength of students is less?
- (ii) What is strength of students in group (61 – 70)?
- (iii) What is the strength of students from 31 to 60?
- (iv) Tell the group having maximum frequency?
- (v) What is strength of total students?

3.

Groups / Classes	Frequency (f)
100 – 114	8
115 – 129	15
130 – 144	24
145 – 159	33
160 – 174	21
175 – 189	12
190 – 204	5

In above data give the answers of the following questions.

- (i) What is the lower class limit of first class?
- (ii) What is the frequency of group (175 – 189).
- (iii) In data what is lower frequency?
- (iv) In data what is upper class limit of middle group?
- (v) What are frequencies of first three groups?

13.2 Pie Graph

The presentation of numerical data in the form of disjoint sectors of a circle is called pie graph. It is also called a circular graph.

The angle of a circle is 360° and data is represented in different sectors equal to 360° . The angles for each component are calculated and these angles are made in the circle to show different components.

Example Out of 1200 students in a school 500 play football, 250 play hockey, 300 play cricket and 150 do not participate in any game. Represent the data by pie graph.

Solution

Total students = 1200

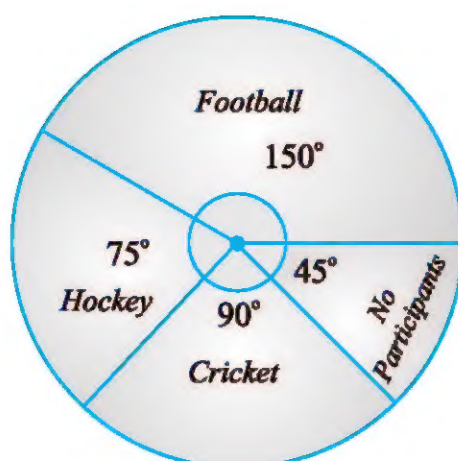
$$\text{Angle of sector} = \frac{\text{No. of students}}{\text{total students}} \times 360^\circ$$

Games	No. of Students	Angle of sector = $\frac{\text{No. of Students}}{\text{Total Students}} \times 360^\circ$
Football	500	$= \frac{500}{1200} \times 360^\circ = 150^\circ$
Hockey	250	$= \frac{250}{1200} \times 360^\circ = 75^\circ$
Cricket	300	$= \frac{300}{1200} \times 360^\circ = 90^\circ$
No participation	150	$= \frac{150}{1200} \times 360^\circ = 45^\circ$

Sum of angles of sectors must be equal to 360°

In order to draw a pie graph

1. Draw a circle of a suitable radius.
2. Draw an angle of 150° representing the football.
3. Draw an angle of 75° representing the hockey.
4. Draw an angle of 90° representing the cricket.
5. Subsequently the remaining angle will be 45° which reflect number of students playing no game.



From the above pie graph, we conclude that most of the students play football.

Example Represent the following data by pie graph.

Items of Expenditure	Food	Clothing	House Rent	Education	Fuel and Light	Miscellaneous
Amount (Rs.)	5000	1500	3000	1000	500	1000

Solution

$$\text{Angle of sector} = \frac{\text{Expenditure of Item}}{\text{Total Expenditure}} \times 360^\circ$$

Angle of sector for food	$= \frac{5000}{12000} \times 360^\circ = 150^\circ$
Angle of sector for clothing	$= \frac{1500}{12000} \times 360^\circ = 45^\circ$
Angle of sector for House Rent	$= \frac{3000}{12000} \times 360^\circ = 90^\circ$
Angle of sector for Education	$= \frac{1000}{12000} \times 360^\circ = 30^\circ$
Angle of sector for Fuel and light	$= \frac{500}{12000} \times 360^\circ = 15^\circ$
Angle of sector for Miscellaneous	$= \frac{1000}{12000} \times 360^\circ = 30^\circ$



From the pie graph, we conclude that on food, the expenditure is highest.

EXERCISE 13.2

1. Shaista spends 35% of her salary on food, 30% on education, 25% on clothes. She saves 10% every month. Represent the data by pie graph.
2. In a class, the grades obtained by the students in the final examination are given below. Draw the pie graph.

Grade	A	B	C	D	E
No. of Students	4	10	25	15	6

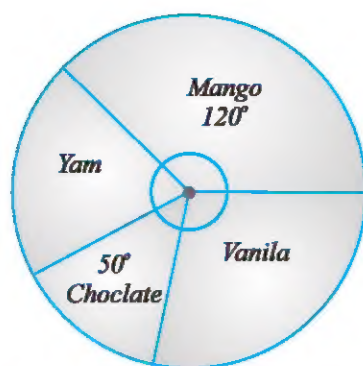
3. In a monthly test, Umair got the following marks in different subjects. Construct a pie graph.

Subjects	English	Urdu	Math	Science	History	Islamiat
Marks	22	27	25	19	26	25

4. Number of students in five schools of Quetta are given below. Draw a pie graph.

School	I	II	III	IV	V
No. of Students	1500	1200	1800	600	400

5. Pupils in a class were asked to indicate which one of the four ice-cream flavours vanilla, chocolate, yam or mango they preferred the following pie chart shows the results.



- If one quarter of the class preferred vanilla flavor, state the angle in the vanilla sector.
- Calculate the angle in yam sector.
- If 5 students indicated a preference for chocolate flavor, calculate the number of students in the class.
- Calculate the percentage of students in the class who preferred yam flavor.

REVIEW EXERCISE 13

- Fill in the blanks.
 - Number of observations occurring in a class interval is called _____.
 - _____ is the difference between the successive lower class limit.
 - In $(41 - 50)$, 41 is called _____.
 - The highest value in a class interval is called _____.
 - The presentation of a numerical data in sectors of a circle is called ____.
- Select the correct answer.
 - In the class interval $(21 - 25)$, the lower class limit is
 (a) 21 (b) 25 (c) 23 (d) 20
 - In the class interval $(31 - 40)$, the upper class limit is
 (a) 31 (b) 40 (c) 30.5 (d) 40.5
 - In a data, lowest value = 21, highest value = 39 size of class interval = 3 then the number of classes is
 (a) 7 (b) 6 (c) 5 (d) 4
 - Sum of angles of sector in a circle must be equal to _____
 (a) 90° (b) 180° (c) 270° (d) 360°
 - The table which shows the frequency of class intervals is called _____
 (a) Frequency table (b) grouped data
 (c) Ungrouped data (d) Pie graph

3. Temperature of the month of April, 2014 of Quetta city is recorded in Celsius degrees as
10, 8, 6, 15, 18, 21, 16, 19, 11, 14, 17, 22, 26, 16, 9, 18, 27, 25, 30, 19, 17, 24, 28, 32, 23, 26, 18, 19, 32, 29

Arrange the data and give the answer of following questions

- (i) Tell the highest value
(ii) Tell the smallest value
(iii) How many time 19 come in data.
(iv) How many total term are in data.
4. No. of bread sold in five days of a week are as under:

Days	Monday	Tuesday	Wednesday	Thursday	Friday
No. of Breads	10	20	18	12	20

By using the table, draw a pie graph.

5. A factory produces three products, x , y and z in the ratio of $x : 9 : 5$. When the output is illustrated by a pie graph, the angle of the sector representing the out of z is 120° . Find x .

SUMMARY

- Data is collected in raw form and it provides us information about individuals.
- If a data is collected initially and has not gone through any statistical work then the data is called ungrouped data.
- If a data has gone through any statistical work than this data is called grouped data.
- In grouped data, each group is known as class interval.
- The smaller value of a class interval is called the lower class limit.
- The higher value of a class interval is called the upper class limit.
- The number of observations occurring in a particular class is called its frequency.
- The presentation of numerical data in the form of sectors of a circle is called pie graph.
- In pie graph, angle measures of 360° is distributed according to the ratio of the size of the groups.

- رشوت لینے اور دینے والا دونوں جہنمی ہیں۔
- بدعنوانی اور رشوت ستانی ضمیر کی موت ہے۔
- بدعنوانی ملکی ترقی کی راہ میں سب سے بڑی رکاوٹ ہے۔
- بدعنوانی سے خود بھی بچیں اور دوسروں کو بھی روکیں۔
- قومی احتساب بیورو بلوچستان

جملہ حقوق بحق بلوچستان ٹیکسٹ بک بورڈ کو محفوظ ہیں

منظور کردہ صوبائی محکمہ تعلیم حکومت بلوچستان کوئٹہ، پاکستان برطانیق قومی نصاب 2006ء اور نیشنل ٹیکسٹ بک اینڈ لرننگ میٹریل پالیسی 2007ء دفتر ڈائریکٹر بیورو آف کریکولم اینڈ ایکسٹینشن سینٹر بلوچستان کوئٹہ بحوالہ مراسلہ نمبر 3204-6/C.B مورخہ 28 نومبر 2014ء اس کتاب کو بلوچستان ٹیکسٹ بک بورڈ نے ناشر سے پرنٹ لائسنس حاصل کر کے سرکاری سکولوں میں مفت تقسیم کے لیے بھی طبع کیا ہے۔ بلوچستان ٹیکسٹ بک بورڈ کوئٹہ اور ناشر کی تحریری اجازت کے بغیر اس کتاب کا کوئی حصہ کسی امدادی کتاب یا گائیڈ وغیرہ میں شامل نہیں کیا جاسکتا۔

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